

ABSTRACT

A single-stage all-pass optical filter is disclosed that may be applied to generate a large tunable delay of an optical pulse train. The all-pass optical filter includes an input port for receiving an input optical pulse having a regular repetition rate; an output port; a splitter/combiner; and one feedback path. A plurality of frequency-dependent time delay periods are applied to the input optical pulse so that the filter is characterized by a time-delay spectrum having a plurality of delay peaks. The free-spectral range (FSR) of the filter, *i.e.*, the spacing between the delay peaks, is matched to the regular repetition rate of the input optical pulse. This matching is accomplished by the FSR being equal to the repetition rate or offset from the repetition rate to a sufficiently small degree that each frequency of the pulse train will fall within the bandwidth of one of the plurality of delay peaks. This single-stage all-pass optical filter is advantageous for correcting linear chirp of a pulsed laser or synchronizing control signals in an optical time-division multiplexer/demultiplexer system.